REMARKS

Claims 1-16, 18-32, 34-48 and 50-65 are pending in this application. Claims 15-16, 31-32, 47-48, 54 and 60 are withdrawn from consideration. By this Amendment, claims 17, 33 and 49 are cancelled (to maintain the same total number of claims and for reasons unrelated to patentability), claims 1, 6, 13, 18, 22, 34, 38, 50, 55 and 61 are amended and new claims 63-65 are added. Attached hereto is a marked-up version of the changes to the claims by the current amendment. The attachment is captioned "Version With Markings To Show Changes Made".

The Office Action contains a misstatement on page 2. Applicants did not elect device claims 1-22 in Paper No. 5. Rather, applicants elected the species of Fig. 9 as is correctly indicated in the Office Action. As will be discussed below, applicants believe that each of independent claims 1, 18, 34, 50, 55 and 61 define patentable subject matter. As stated in the March 20 Response to Restriction Request, applicants believe that independent claims 1, 18, 34 50, 55 and 61 are generic claims to the species of Fig. 9 and other species. Applicants therefore request that the non-elected claims be rejoined and examined. All of the non-elected claims are dependent claims depending from one of the elected independent claims.

The Office Action objects to the title. It is respectfully submitted that the new title is indicative of the invention to which the claims are directed.

The Office Action objects to the disclosure because of informalities. It is respectfully submitted that the above amendment to the specification correctly identifies the referenced application on page 5 of the specification. Withdrawal of the objection to the disclosure is respectfully requested.

The Office Action rejects claims 13, 29 and 45 under 35 U.S.C. §112, second paragraph. By this Amendment, dependent claim 13 is amended to recite "the IHS/IS being electrically connected to the substrate." The specification describes these features in the paragraph beginning on page 13, line 10 of the present specification. It is respectfully submitted that claims 13, 29 and 45 are definite and clear in that they recite that the IHS/IS is electrically connected to the substrate. Withdrawal of the rejection of these claims is respectfully requested.

The Office Action rejects claims 1 and 6-14 under 35 U.S.C. §102(e) by U.S. Patent 6,191,360 to Tao et al. (hereafter Tao). The Office Action also rejects claim 5 under 35 U.S.C. §103(a) over Tao. Still further, the Office Action rejects claims 2-5, 18-30, 34-46, 50-53, 61 and 62 under 35 U.S.C. §103(a) over Tao in view of U.S. Patent 6,338,985 to Greenwood. The Office Action does not address claims 55-59 although they were indicated as reading on the species of Fig. 9. The rejections are respectfully traversed.

Independent claim 1 recites an Integrated Heat Spreader / Integrated Stiffener (IHS/IS) mountable to provide stiffening support to a substrate. The heat spreader/integrated stiffener including a side wall portion to mount transverse to the substrate and a stiffener extension to extend from the side wall portion toward a center of the heat spreader/integrated stiffener. See Fig. 9 and the stiffener extension 630 in Fig. 6.

The Office Action relies on Tao as a primary reference to reject the claims. However, Tao shows a chip 33, a heat spreader 34 and encapsulating material 39. The spreader 34 includes a variety of holes A through which the encapsulating material 39 flows into the spreader 34 during molding. Protrusions 36 are provided

on the bottom part 35 of the heat spreader 34 and are attached to the upper surface 31 of the substrate 30. See Tao's col. 3, lines 45-55.

Tao does not teach or suggest that the heat spreader/integrated stiffener includes a side wall portion to mount transverse to the substrate and a stiffener extension to extend from the side wall portion toward a center of the heat spreader/integrated stiffener. That is, Tao merely shows a heat spreader 34 and encapsulating material over the chip 33. However, Tao does not suggest an extended base, stiffener extension or support shelf 630 such as described in the present specification and shown in Figs. 6 and 9. See page 12, line 16-page 13, line 9 of the present specification. Tao has no suggestion for these features as Tao does not discuss an IHS/IS to provide stiffening support to a substrate. Greenwood does not teach or suggest these features of independent claim 1 missing from Tao. Accordingly, independent claim 1 defines patentable subject matter.

Each of independent claims 18, 34, 50, 55 and 61 define patentable subject matter for at least similar reasons as independent claim 1. Claims 2-14 and claim 63 depend from claim 1, claims 19-30 and 64 depend from claim 18, claims 35-46 depend from claim 34, claims 51-53 depend from claim 50, claims 56-59 depend from claim 55 and claims 62 and 65 depend from claim 61, and therefore define patentable subject matter at least for this reason. In addition, the dependent claims also recite features that further and independently distinguish over the applied references. For example, dependent claim 63 recites that the stiffener extension extending from a lip of the substrate towards a center of the substrate. For similar reasons as discussed above, Tao does not teach or suggest these features of dependent claim 63. Tao does not suggest a stiffener extension extending from a lip

of the substrate. Tao's heat spreader 34 does not even extend to the lip of the substrate 30. Tao also does not recognize the advantages of these features, namely the further stiffening support to the substrate. Thus, dependent claim 63 (and similarly dependent claim 64 and 65) define patentable subject matter for at least these additional reasons.

Additionally, dependent claim 13 recites that the IHS/IS is electrically connected to the substrate. Tao does not suggest this feature. As such, dependent claim 13 (and similarly dependent claims 29 and 45) define patentable subject matter for at least this additional reason.

For at least the reasons set forth above, it is respectfully submitted that each of claims 1-14, 18-30, 34-46, 50-53, 55-59 and 61-65 define patentable subject matter. In view of the allowability of the generic independent claims 1, 18, 34, 50, 55 and 61, applicants request that the non-elected dependent claims be rejoined with the elected claims. These claims should also be allowable since they depend from allowable independent claims. Withdrawal of the outstanding rejections are respectfully requested.

CONCLUSION

In view of the foregoing, it is respectfully submitted that the above-identified application is in condition for allowance. Favorable consideration and prompt allowance of claims 1-16, 18-32, 34-48 and 50-65 are respectfully requested.

Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, or credit any overpayment of fees, to the

deposit account of Antonelli, Terry, Stout & Kraus, LLP, Deposit Account No. 01-2135 (referencing case no. 219.40430X00).

Respectfully submitted,

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"Version With Markings To Show Changes Made"

IN THE TITLE:

The title has been amended as follows:

Please change the title to --HEAT SPREADER AND STIFFENER HAVING A STIFFENER EXTENSION--.

IN THE SPECIFICATION:

Paragraph beginning on page 5, line 7 has been amended as follows:

--The IHS/IS may also be adapted to have an electrical function. Reference is made to U.S. Patent Application No. 09/964,586 entitled "Arrangements to Supply Power to Semiconductor Package" by inventors Kristopher Frutschy, Chee-Yee Chung, and Bob Sankman filed on a same date as the filing of this patent application.--

IN THE CLAIMS:

Claims 1, 6, 13, 18, 22, 34, 38, 50, 55 and 61 have been amended as follows:

1. (Twice Amended) An Integrated Heat Spreader / Integrated Stiffener (IHS/IS) mountable to provide stiffening support to a substrate, the heat spreader/integrated stiffener including a side wall portion to mount transverse to the substrate and a stiffener extension to extend from the side wall portion toward a center of the heat spreader/integrated stiffener.

6. (Twice Amended) An IHS/IS as claimed in claim 1, the [IHS/IS] stiffener extension comprising having an integrated stiffener extension which is substantially planar for mounting to a substantially planar die-side surface of the substrate.

13. (Twice Amended) An IHS/IS as claimed in claim 1, the IHS/IS being electrically [connectable] connected to the substrate.

18. (Twice Amended) A carrier package comprising:

one of a thin-core and coreless substrate of an IC-PCB; and

an IHS/IS mounted to provide stiffening support to said substrate, the IHS/IS including a side wall portion to mount transverse to the substrate and a stiffener extension to extend from the side wall portion toward a center of the IHS/IS.

22. (Twice Amended) A carrier package as claimed in claim 18, the [IHS/IS having] stiffener extension comprising an integrated stiffener extension which is substantially planar and mounted to a substantially planar die-side surface of the substrate.

34. (Twice Amended) A packaged integrated circuit (IC) comprising:

an IC-PCB carrier package including one of a thin-core and coreless substrate; and

an IHS/IS mounted to provide stiffening support to said substrate, the IHS/IS including a side wall portion to mount transverse to the substrate and a stiffener extension to extend from the side wall portion toward a center of the IHS/IS.

38. (Twice Amended) A packaged IC as claimed in claim 34, the [IHS/IS having] stiffener extension comprising an integrated stiffener extension which is substantially planar and mounted to a substantially planar die-side major planar surface of the substrate.

50. (Amended) A heat spreader/stiffener device comprising a thermally conductive member having a side wall portion and a stiffener portion mountable to one of a thin-core and coreless substrate so as to increase a stiffness thereof, the stiffener portion to extend from the side wall portion toward a center of the heat spreader/stiffener device, the heat spreader/stiffener device having a thermal path thermally connectable to the substrate.

55. (Amended) An integrated circuit (IC) carrier package comprising:

an IC;

at least one of a thin-core and coreless substrate; and

a heat spreader/stiffener device with a thermally conductive member having a side wall portion and a stiffener portion mounted to the substrate so as to increase the substrate stiffness, the stiffener portion to extend from the side wall portion toward a center of the heat spreader/stiffener device, the heat spreader/stiffener device having a thermal path thermally connected to the substrate.

61. (Amended) An electronic system comprising:

an IC carrier package including an IC;

at least one of a thin-core and coreless substrate; and

a heat spreader/stiffener device with a thermally conductive member having a side wall portion and stiffener portion mounted to the substrate so as to increase the substrate stiffness, the stiffener portion to extend from said side wall portion toward a center of the heat spreader/stiffener device, the heat spreader/stiffener device having a thermal path thermally connected to the substrate.